200 sq m house

PROJECT EXECUTION DOCUMENTATION FOR A KNX/EIB INSTALLATION

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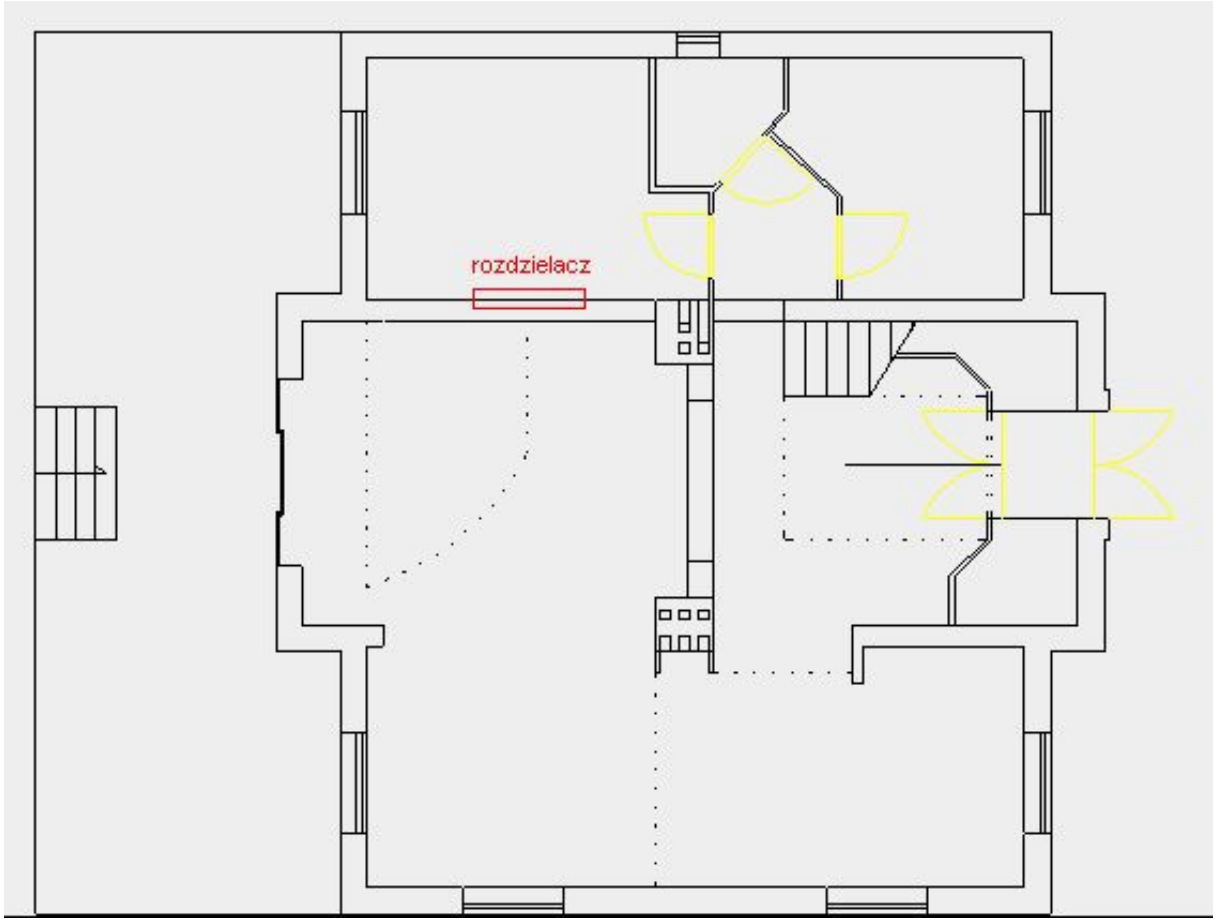
1. FLOORS VIEV

1.1 Ground floor view



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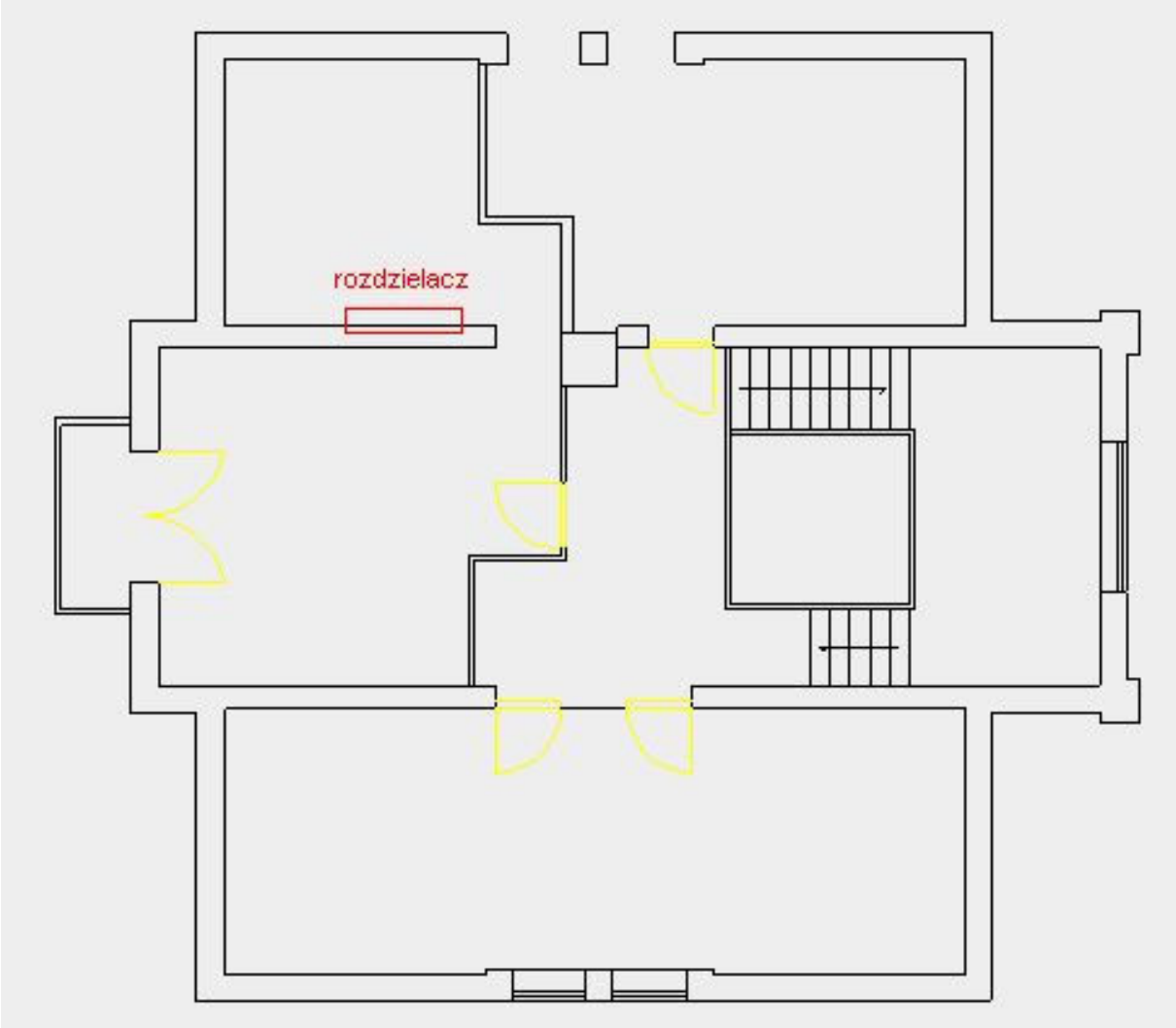
1.2 Upper floor view



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2. ELECTRIC ENERGY SUPPLY FOR THE BUILDING

2.1 Electric energy supply for the site

The residential building will be supplied with power according to the technical conditions of power supply, via the projected cable-meter connection. The main switch cabinet for the ground floor is located in the boiler room, accessible at right from the entrance to the building. The YKY 5x10 mm^2 power supply cable should be run to the switch cabinet in a protective pipe. The cable should be introduced via terminals to the main disconnector of the switch cabinet. **The switch cabinet will have the following dimensions: height h=1500 mm, width s=1050 mm, depth g=0,250 m.** All electric circuits from inside and outside the building should run to the switch cabinet. Connection power 11 kW. Nominal current of the protective fuse upstream from the meter - 20A.

Description of electric switch cabinets:

NAME	CONNECTION CABLE	LOCATION
RG (main switch cabinet	YKY 5x10mm^2	Boiler room

3. ELECTRIC INSTALLATIONS

3.1 General remarks

The Instabus KNX/EIB smart system is foreseen for installation in the building. An assumption when designing the electric installations was the increase of comfort of use and flexibility in comparison to traditional installations. The fulfilment of these assumptions is possible through either installation of multiple control and supervision systems, or through the installation of one universal system, this being the 'instabus KNX/EIB' system.

The KNX/EIB system is an intelligent, decentralised electric installation system for switching, control, adjustment and oversight of electric equipment installed in a building. In the KNX/EIB system, control of receivers is conducted via one common installation bus to which both sensors (components issuing commands) as well as actuators (components executing commands) are connected. One can

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also connect to the bus components delivering specific information i. e. on the opening of a window, on detection of a person in a given room or on the stairs, on reaching a specified temperature in a selected room, on reaching a selected light level, etc. This data can then be used in suitable control algorithms.

In the designed building, actuators were located in electric switch cabinets, and sensors in each of the rooms. Such a solution allows the execution of all system functions while at the same time reducing costs, in comparison to distributing the actuators and installing them at different spots.

***Note**:*
The KNX/EIB installation bus is powered by 24V DC (SELV) voltage, which makes it safe for the user even in cases and places of increased electric shock protection requirements.

3.2 Description of KNX/EIB cabling

Cabling for the KNX/EIB system is based on a bus cable executed using 2x2x0,8mm cable. The KNX/EIB bus should be connected only in junction boxes foreseen for equipment of the KNX/EIB bus. The cables need to be run along walls or the ceiling. The bus cable can be laid along 230V power supply cabling on the condition that both cables are in double insulation.

The KNX/EIB system will be composed of one line. There is the option of dividing the KNX system into multiple lines in case of installation of more than 64 components.

All control points, such as i. e. switches on walls, are to be powered via the KNX/EIB cable. The KNX/EIB cable must also be run to the central unit for the PC, TV, alarm and audio systems (if applicable). The cable is run from the switch cabinet, through all points on the same level, and back again to the same switch cabinet. The KNX/EIB cable can be branched out freely (best at points foreseen for the installation of equipment, so as not to install additional junction boxes).

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Note:

Any changes to the software may be introduced by qualified personnel of the maintenance company only. Changes should be executed upon prior creation of a copy of the current design in the ETS3 computer system. Any unauthorised changes can result in damage to controlled components or other devices functionally connected with those.

3.3 Installation of lighting

Lighting control is executed by sending commands via the KNX/EIB installation bus. In the installation plans there are marked points of installation of end receivers of the KNX/EIB system. The assigning specific receiver units to a given control component can be executed both at time of installation and programming of the system, as well as in during its future use.

The power supply installation for luminaires should be effected via 3x1,5mm^2 YDY cables (or YDYżo, YDYtżo cables, as per the norm) laid in plaster or in RVKL15 piping. The cables should run on the walls or the ceiling. **For all circuits use cables with PE protective wire**. Each cable of the installation has to be, on both ends, permanently marked with the number of the circuit it is supposed to power.

During installation of luminaires one has to account for their proper selection in the scope or protection of the luminaire cover: Sconces and luminaires for humid rooms, bathrooms, the garage and technical rooms should be at least IP 44 compliant, recommended insulation class II, horizontal distance of assembly point to bath or basin edge over 60 cm (do not install any luminaires above the outline of the bath or basin). The design does not cover laying of the installation outside of the building.

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3.4 Installation of sockets for plugs

Outlets for plugs can be powered via the KNX system. To each controlled socket (marked with the letter 's') one has to run a separate 3x2,5 mm^2 cable from the main switch cabinet.

Outlets that are not meant to be controlled should be assembled in groups of ten for a room or adjoining rooms. It's best to run the cable from socket to socket, without additional connection points. **For all circuits use cables with PE protective wire**.

All single-phase cables should be installed with a protective bolt securing at least IP 20 protection class. For humid rooms, bathrooms, the garage and technical rooms it's best to use insulated sockets, securing protection of at least class IP 44.

Junction boxes for equipment - if not stated otherwise in the installation plans - should be installed at a height of 20-30 cm above the floor. Deep interconnectable junction boxes of a diameter of 60 mm should be used. The power supply for the sockets should be executed in the plaster or in protective RVKL 18 or RVKL 21 piping, type YDYpzo (YDYżo,YDYtżo as per the respective norm) using cables of sizes 3x2,5 mm^2, 4x2,5mm^2 and 5x2,5mm^2. Power supply for the cooker is to be executed via a YDY 5x4 mm^2 cable in the plaster or in a flush-mounted RVKL 28 protective pipe.

3.5 PC socket installation

The server unit and the central phone unit is located in the main switch cabinet in the boiler room. All internet and phone cabling has to run to this cabinet. **Internet and telephone service suppliers' cables are to run to the switch cabinet**. Use shielded FTP CAT6 cables. **FTP cables should not run parallel to the power supply cables.** Run cabling in the plaster in protective ribbed tubing.

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3.6 Radio and TV installation

All cables from the cabinet in the attic (location marked in plans) should run in star formation to the selected rooms. Run cables from satellite receiver units, antennas, as well as ground-based TV cabling to the attic. Run 230 V power supply to RTV cabinet. KOKA 799 HIRSCHMANN cabling is recommended.

3.7 Installation of KNX/EIB control consoles

Junction boxes for most KNX/EIB control consoles are standard electric device junction boxes (60 mm diameter). Certain consoles are equipped with their own junction boxes. **ONLY** junction boxes allowing the installation of equipment using screws may be used. Junction boxes for consoles are to be installed at a height of 140 cm above the floor, unless stated otherwise in the plan.

KNX/EIB motion detectors are to be treated as switches, junction boxes (60 mm diameter, deep) should be installed for them. Run KNX/EIB cable to each junction box.

For consoles marked 'PANEL' in the design run the power supply directly from the main electric switch cabinet via a 2x1,5mm^2 OWY cable, as well as the KNX/EIB cable and the FTP network cable.

3.8 Installation of heating control

Water-based radiator heating was installed in the building, itself divided into eight zones - for the ground floor and upper floor. Zone 1 - corridor, zone 2 - living room, 3 - dining room, 4 - study, 5 - bedroom, 6 - room 1, 7 - room 2, 8 - bathroom. Temperature control will be executed via actuators installed at the splitters. The location of the splitters is shown in the design, for each splitter run on each floor an OWY 7x1,5mm^2 cable and the KNX/EIB bus cable. Temperature control will be effected via thermostats built into the KNX/EIB consoles.

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3.9 Integration with the alarm system (if required by investor)

A logical connection has to be set up between the luminaires and lighting on the one hand and the contactors in doors and windows on the other hand. For this purpose near the central alarm unit an array of two-state inputs with 32 inputs (or a multiple of this number) will be installed. The central alarm unit should be equipped with two-state outputs allowing the transmission of information on the states of selected (groups of) contactors in doors and windows, as well as the states of flood, gas, zone security sensors, etc. to the KNX/EIB system. Precise location of the central alarm unit according to the alarm system design plans. To the input array (of the central alarm unit) run the KNX/EIB bus cable - YnTKSYekw 1x4x08mm - and install a power supply socket for the module.

3.10 Electric shock protection

Internal installations in the building should be executed in the TNS system. Quick disconnection using residual current devices with a nominal actuation current of 30mA were used as electric shock protection, as well as additional equipotential bonding according to norm PN-IEC 60364-4-41.

From the GSU to the boiler room, bathrooms, toilet and kitchen run equipotential bonding via a LYżo 1x6 mm^2 cable. Protection cabling cannot be shielded and split with connectors, and must have yellow-green insulation.

Upon execution of electric energy installations covered by this design execute protection effectiveness measurements, and hand over the measurement protocols to the User.

Note:

Due to the need for correct operation of the KNX/EIB installation, the ability to program the system and future safety of the building we advise to bestow a specialised, authorised company with the task of execution of the whole installation or oversight and start-up.

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3.11 Installations in rooms equipped with a bath or shower

In such rooms one can distinguish between four zones:

- **zone 0** is the interior of the bath or the shower basin
- **zone 1** is limited by the following planes: vertical - running along the outside edge of the bath, shower basin or at a distance of 60 cm from the shower in case of a shower basin; vertical - running at a height of 225 cm above floor level,
- **zone 2** is limited by the planes: vertical - running at a distance of 60 cm outside the plane limiting zone 1; horizontal - running at a height of 225 cm above floor level,
- **zone 3** is limited by the planes: vertical - running at a distance of 240 cm outside of the plane limiting zone 2; vertical, running at a height of 225 cm above floor level.

In such rooms basic fire prevention rules apply, as well as general provisions for installation of equipment, accessories, cabling and receiving units, meaning:

- the execution of additional (local) equipotential bonding, connecting all alien conductive parts with each other and with the protective cabling. This pertains to such alien conductive components as: metal baths, basins, all kinds of pipes, faucets, taps, water-based radiators, water heaters, accessories, construction structures and rebar. In case of using in installations for warm or cold utility water pipes made of synthetic materials instead of metal pipes, equipotential bonding should cover all kinds of metal components which may come into contact with water in these pipes, like faucets and taps,
- installation of electric sockets in zone 3 or at a distance lower than 60 cm from the door opening of a prefabricated shower cabinet. These sockets have to be protected with ground fault interrupters with a nominal current value of 30 mA or supply power individually from a separation transformer or using voltage not exceeding the contact voltage allowed for long-term contact (SELV circuit),
- installation of multi-wire insulated cables in insulation or single-wire cables in piping made of insulating material,
- installation of junction boxes, splitters and branching devices as well as connection equipment outside of zones 0, 1 and 2,

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● installation in zone 1 only of electric water heaters, and in zone 2 only of luminaires of protection class II, and electric water heaters,

● option of using in zone 0 of voltage of values not exceeding 12 V. The power source supplying this voltage should be located outside of this zone,

● the option of installing radiators in the floor on condition of covering them with a metal mesh or sheet metal and connected to additional (local) equipotential bonding,

● the equipment and accessories should be of protection level not less than IPX7 for zone 0, IPX5 for zone 1, IPX4 for zone 2, and IPX1 for zone 3.

3.12 Final remarks

a) the works should be executed according to European Norms currently in force and the technical conditions.

b) when executing the installations via cables in flush-mounted piping the following rules should be abided by:

● the routes of the cables should be vertical or horizontal, parallel to edges of walls and ceilings,

● making grooves or pits in the walls and drilling of openings should be executed so that the load bearing structural components of the building are not damaged. In buildings in which installations of other branches were already executed, special care must be taken when drilling and breaking walls, in order not to damage completed systems,

● bracing elements, hooks and dowels should be adapted to the material of which the respective bed is made of.

c) upon completion of the works one should:

● execute assembly examinations covering tests and measurements. The scope of the basic assembly examinations covers:

- protection cabling continuity measurements, including main and additional (local) equipotential bonding through measurements of resistance values of protection cabling: continuity measurements of protection cabling as well as main and additional (local) equipotential bonding is to be executed via the technical method or via a resistance meter. Resistance measurements of protection cabling covers the execution of resistance measurements between every conducting part that is

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available and the nearest point of the main equipotential bonding (main earthing rail); measurements of resistance of the installation insulation and of the cable lines should be executed separately for each circuit, from the power connection side: insulation resistance should be measured:

a) between working wires taken one after another in pairs (in practice these measurements can only be done during installation assembly before connection of receiving units),

b) between each working wire and the ground. Insulation resistance, measured using measurement voltage of 500 V DC is considered satisfactory if its value for each circuit with all receiving devices switched off is not lower than 0,5 MΩ. If there are any electronic devices in the circuit one only needs to execute measurements between phase connectors joined together with the neutral wire, and the ground. Use of these precautions is necessary, because the execution of measurements without joining the working wires could cause damage to the electronic equipment.

In case of SELV circuits, minimum insulation resistance is 0,25 MΩ at a measurement test voltage of 250 V DC. Control check of operation of ground fault interrupters: a control check should be carried out by a test device or using technical methods; control check for protection against indirect contact through automatic power cutoff by overcurrent disconnectors.

A protocol of the assembly tests needs to be drawn up.

● creation of as-is documentation, which should cover in particular:

- an updated technical design, including as-is drawings of installation routing,
- protocols of the assembly tests.

Electric installations in conditions of increased risk of electric shock.

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4. LOAD ON THE LIGHTING INSTALLATION

For the calculations, installed (required) power per circuit was assumed as 100W.

4. 1 Summary of installed power

Circuit no.	Room	Power [W]	Calc. current [A]	Count	Cable type and diameter
LIGHTING GROUND FLOOR					
WY01	Vestibule	100	0,43	1	YDY 3x1,5
WY02	Vestibule	100	0,43	1	YDY 3x1,5
WY03	Vestibule	100	0,43	1	YDY 3x1,5
WY04	Corridor	100	0,43	4	YDY 3x1,5
WY05	Study	100	0,43	1	YDY 3x1,5
WY06	Study	100	0,43	1	YDY 3x1,5
WY07	Study	100	0,43	3	YDY 3x1,5
WY08	WC	100	0,43	1	YDY 3x1,5
WY09	Boiler room	100	0,43	2	YDY 3x1,5
WY10s	Living room	100	0,43	1	YDY 3x1,5
WY11s	Living room	100	0,43	4	YDY 3x1,5
WY12s	Dining room	100	0,43	1	YDY 3x1,5
WY13s	Kitchen	100	0,43	3	YDY 3x1,5
WY14	Kitchen	100	0,43	4	YDY 3x1,5
WY15	External circuits	100	0,43	1	YKY 3x1,5
WY16	External circuits	100	0,43	1	YKY 3x1,5
WY17	External circuits	100	0,43	1	YKY 3x1,5
WT18	External circuits	100	0,43	1	YKY 3x1,5
WY19	External circuits	100	0,43	1	YKY 3x1,5
LIGHTING UPPER FLOOR					
WY01	Corridor	100	0,43	3	YDY 3x1,5
WY02	Bathroom	100	0,43	5	YDY 3x1,5
WY03	Bathroom	100	0,43	2	YDY 3x1,5
WY04s	Master bedroom	100	0,43	2	YDY 3x1,5
WY05s	Master bedroom	100	0,43	3	YDY 3x1,5
WY06	Wardrobe	100	0,43	2	YDY 3x1,5
WY07	Room 1	100	0,43	4	YDY 3x1,5
WY08	Room 2	100	0,43	4	YDY 3x1,5
WY09	Stairs	100	0,43	10	YDY 3x1,5
WY10	Stairs	100	0,43	3	YDY 3x1,5
WY11	Corridor	100	0,43	1	YDY 3x1,5
WY12	Room 1	100	0,43	1	YDY 3x1,5
WY13	Room 2	100	0,43	1	YDY 3x1,5

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5. LOAD OF THE SOCKETS AND CONNECTED APPLIANCES

For the calculations installed power per outlet was assumed at 200W.

5.1 Calculation results summarised in table 2.

Circuit no.	Room	Power [W]	Calc. current [A]	Count	Cable type and diameter
SOCKETS GROUND FLOOR					
SO01	Kitchen	7000	10	1	YDY 5x4
SO02	Kitchen	1800	7,82	9	YDY 3x2,5
SO03	Kitchen	600	2,61	2	YDY 3x2,5
SO04	Kitchen	200	0,86	1	YDY 3x2,5
SO05	Kitchen	700	3,04	2	YDY 3x2,5
SO06	Dining room, Living room	1200	5,21	6	YDY 3x2,5
SO07	Living room	700	1,73	2	YDY 3x2,5
SO08	Outside	200	1,73	2	YDY 3x2,5
SO09	Boiler room	200	0,86	1	YDY 3x2,5
SO10	Boiler room	400	1,73	2	YDY 3x2,5
SO11	Boiler room	400	1,73	2	YDY 3x2,5
SO12	Boiler room	200	0,86	1	YDY 3x2,5
SO13	WC, Corridor	1000	4,34	5	YDY 3x2,5
SO14	Study	800	3,47	4	YDY 3x2,5
SO20s	Living room	200	0,86	1	YDY 3x2,5
SO25s	Water pump	200	0,86	1	YDY 3x2,5
SO26	Gazebo	400	1,73	1	YKY 3x2,5
BR01	Outside	200	0,86	1	YKY 3x2,5
BR01	Outside	200	0,86	1	1xUTP
BR02	Outside	200	0,86	1	YKY 3x2,5
BR02	Outside	200	0,86	1	1xUTP
MATA	Outside	200	0,86	1	YKY 4x2,5
Switch cabinet 1	Boiler room			1	OWY 7x1,5
SUB	Living room	1000	4,3	1	YDY 3x1,5
Fireplace	Living room	100	0,43	1	YDY 3x2,5
Septic tank	Outside	1000	4,3	1	YKY 5x2,5
OUTLETS UPPER FLOOR					
SO15	Master bedroom	1400	6,08	7	YDY 3x2,5
SO16	Room 1	1200	5,21	6	YDY 3x2,5
SO17	Room 2	1200	5,21	6	YDY 3x2,5
SO18	Wardrobe, Bathroom	800	3,47	4	YDY 3x2,5
SO19	Attic	400	1,73	2	YDY 3x2,5
SO21s	Room 1	200	0,86	1	YDY 3x2,5
SO22s	Room 2	200	0,86	1	YDY 3x2,5
SO23s	Bedroom	200	0,86	1	YDY 3x2,5
OL	Bathroom	200	0,86	1	YDY 3x1,5
Bath power		200	0,86	1	YDY 3x1,5
Switch cabinet 2	Wardrobe			1	OWY 7x1,5

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WINDOW BLINDS GROUND FLOOR					
B 01	Living room	35	0,15	1	YDY 4x1,5
B 02	Living room	35	0,15	1	YDY 4x1,5
B 03	Dining room	35	0,15	1	YDY 4x1,5
B 04	Dining room	35	0,15	1	YDY 4x1,5
B 05	Kitchen	35	0,15	1	YDY 4x1,5
B 06	Kitchen	35	0,15	1	YDY 4x1,5
B 07	Study	35	0,15	1	YDY 4x1,5
B 08	Boiler room	35	0,15	1	YDY 4x1,5
Projector	Living room	35	0,15	1	YDY 4x1,5
Screen	Living room	35	0,15	1	YDY 4x1,5
WINDOW BLINDS UPPEB FLOOB					
B 09	Master bedroom	35	0,15	1	YDY 4x1,5
B 10	Master bedroom	35	0,15	1	YDY 4x1,5
B 11	Room 1	35	0,15	1	YDY 4x1,5
B 12	Room 2	35	0,15	1	YDY 4x1,5
B 13	Bathroom	35	0,15	1	YDY 4x1,5
B 14	Bathroom	35	0,15	1	YDY 4x1,5
TELETECHNICS GROUND FLOOR					
TV01	Living room			1	KOKA799
PC01a	Living room			1	1xFTP
PC01b	Living room			1	1xFTP
PC02a	Study			1	1xFTP
PC02b	Study			1	1xFTP
PC03a	Corridor			1	1xFTP
PC3b	Corridor			1	1xFTP
VID1	At entry gate			1	2xUTP
VID2	Kitchen			1	2xUTP
Lock	Entrance door			1	1xUTP
Projector	Living room			1	HDMI
Projector	Living room			1	OWY 4x1
Refrigerator	Kitchen			1	2xFTP
Dishwasher	Kitchen			1	2xFTP
Washing machine	Boiler room			1	1xFTP
Panel	Living room			1	OWY2x1
Meteo	Outside			1	OWY2x1
Meteo	Outside			1	1xUTP
Boiler temp. sensor	Outside			1	OWY 2x1,5
Septic tank level sens.	Outside			1	1xUTP
TELETECHNICS UPPER FLOOR					
TV02	Master bedroom			1	KOKA799
TV03	Room 1			2	KOKA799
TV04	Room 2			2	KOKA799
PC04a	Room 1			1	1xFTP
PC4b	Room 1				1xFTP
PC05a	Room 2			1	1xFTP
PC05b	Room 2			1	1xFTP
Bath water level sensor	Bathroom			1	1xUTP
VID3	Corridor			1	2xUTP

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CRESTRON HDMI					
TV01c	Living room			1	2xFTP
TV01c	Living room			1	OWY 4x1
TV02c	Master bedroom			1	2xFTP
TV02c	Master bedroom			1	OWY 4x1
TV03c	Room 1			1	2xFTP
TV03c	Room 1			1	OWY 4x1
TV04c	Room 2			1	2xFTP
TV04c	Room 2			1	OWY 4x1
AUDIO					
G1a	Living room			1	SUPRA PLY 3,4
G1b	Living room			1	SUPRA PLY 3,4
G1c	Living room			1	SUPRA PLY 3,4
G2a	Living room			1	SMYP 2x2
G2b	Living room			1	SMYP 2x2
G3	Living room			1	RCA-RCA
G4a	Master bedroom			1	SMYP 2x2
G4b	Master bedroom			1	SMYP 2x2

Total installed power: **15.255 W**
Assumed simultaneity factor – **0,611**

Calculation power for building: **P_{obl}= 15255*0,611 = 9320,8W**

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6. DETERMINATION OF CABLE DIAMETER

The determination of cable diameter covers:
- selection of cable diameter based on long-term electric current load, determination based on load tables for the particular type of wire and installation conditions, the allowable long-term load capacity of which is higher than the calculation current $I_d > I_{obl}$,
- control check whether the selected cable is satisfactory for mechanical considerations,
- control check whether voltage drop levels will not be exceeded.

Installation circuits must be protected against:
- effects of overload currents,
- effects of short-circuit currents.

$$I_{obl} =< I_n =< I_d$$
$$I_2 =< 1{,}45\ I_d$$

where:
- calculation current for load on circuit,
- allowable long-term cable load capacity,
- nominal current of protection device,
- actuation current of protection device.

Devices protecting against effects of short-circuit currents should fulfil the following requirements:
- provide the ability to cut the short circuit current flow of a value not less than the value of expected short circuit current that may arise at the point of installation of the device:

$$I_w >= I_k''$$

where:
I_w - - shutoff ability of the device
I_k'' - initial short circuit current
- the time of cutting the short-circuit current flow of a given value at any point of the electric circuit should be such that the temperature of the wires does not exceed the limit temperature value allowed during a short circuit for the particular type of cable.
This time, in seconds, should not be longer than the limit value allowable according to the formula:

$$t=(k*s/\ I_k'')^2$$

where:
s - wire cross section,
k - factor depending on the properties of insulating materials and cables (for Cu in polyvinyl insulation this is 115),
I " - initial short-circuit current

When the short circuit time, calculated according to the formula above, is lower than 0,1s then the following condition must be met:

$$(k*s)^2 >= I^2 t$$

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where:
I^2t - amount of thermal energy (value given by device manufacturer)
s - wire cross section
k - factor dependent on the properties of insulation materials and of the wires.

The circuit protection devices must act selectively, i. e. the protection device closer to the point of short circuit or overload should act more quickly than the device located further away on the line.

Selective operation of protective devices installed in a circuit in series is abided by if time over current characteristics t-I (for overload currents) and I^2*t-I characteristics (for short-circuit currents) do not overlap.

Ranges of overload currents for selective and non-selective operation of protection devices are given by the manufacturer.

For lighting circuits assumed was a suggested copper wire cross section of 1,5 mm2. For electric sockets of general use and sockets powering heating devices, assumed was a recommended copper wire cross section of Cu2,5 mm2. For remaining circuits - according to calculations.

Nominal current values of protection devices of characteristics B and C with nominal short-circuit connection capacity of 6kA were selected using the Schrack product catalogue.

Building calculation power: **9320,8 W** assumed cosΦ=0.93

$$I_{obl} = \frac{P_{obl}}{\sqrt{3}x400x\cos\delta} = \frac{9320,8}{538,68} = \mathbf{17,3\ A}$$

I_{obl} = 17,3 A

Assumed cable type YKY 5x10mm^2 , I_d = 82 A

$$I_d > I_{obl}$$

And nominal current of the protection disconnector I_n = 63A.
So the condition is:

$$I_{obl} =< I_n =< I_d$$
$$17,3=<63A<82$$

And

$$I_2 < 1,45xI_d$$

$$I_2 = 1,2xI_n = 1,2x63 = 75,6$$

$$75,6<1,45x82$$

$$75,6<118,9$$

The condition is met.

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7. DESCRIPTIONS OF DRAWINGS

1. Electric diagram of main electric switch cabinet
2. General view of electric cabinet
3. View of electric cabinet terminals
4. Design - ground floor lighting installation
5. Design - upper floor lighting installation
6. Design - ground floor emergency lighting installation
7. Design - upper floor emergency lighting installation
8. Design - ground floor blinds installation
9. Design - upper floor blinds installation
10. Design - ground floor KNX bus installation
11. Design - upper floor KNX bus installation
12. Design - ground floor sockets installation
13. Design - upper floor sockets installation
14. Design - ground floor teletechnic installation
15. Design - upper floor teletechnic installation
16. Design - ground floor alarm installation
17. Design - upper floor alarm installation
18. Design - ground floor audio installation
19. Design - upper floor audio installation

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